ART. IX.—*Phosphorus Necrosis. Extirpation of the Whole of the Right Half and Part of the Left Half of the Lower Jaw, without External Incision.* By WM. HUNT, M. D., one of the Surgeons of the Pennsylvania Hospital.

FREDERICK COURTNEY, aged 22, single, a native of England, admitted to the Pennsylvania Hospital January 11, 1865. Has been in this country three and a half years, and has followed his business, that of a lucifer match maker, at Wilmington, Delaware. He has been in the business for sixteen years, and has been a "dipper" during half that time. His family is healthy, and his own condition was perfectly so until the beginning of his present trouble. His teeth were sound, with the exception of one slightly carious molar of the right side of the lower jaw. From this he habitually picked away small pieces of food after eating. Soon there was pain about its root, and it was extracted. From this time (seven months since) the peculiar phosphorus necrosis may be said to have fairly begun, and it progressed rapidly, for the subject of it was compelled to give up the charge of his department about a fortnight after the tooth was drawn.

At the time of admission he was pale, thin, and weak; pulse 90 to 100. The face was very much deformed by indurated swelling, which was particularly conspicuous on the right side and about the chin. Three fistulous openings, surrounded by flabby granulations, were upon the right side of the neck. From these fetid pus exuded freely. A horribly offensive odour came from the mouth, and saliva and pus were constantly dribbling out. The gums were spongy on the margin, but partook of the general induration at the sides. Four sound but loose teeth occupied the right alveolar cavities. The upper jaw seemed healthy. The patient could not part the two jaws sufficiently to introduce a finger with facility. A probe detected necrosed bone both on examination in the mouth and through the sinuses. The examinations gave excessive pain. A portion of the left lower jaw only seemed clear of the disease. The symphysis was completely involved. The *morale* of the patient was excellent, in fact extraordinary. He seemed to be well acquainted with the disease, had seen it in England, and in most cases the bone had come away in pieces, or the patients had been worn out, and some may have died from exhaustion. He was ready to submit to anything for relief, but requested me, if possible, to operate from the inside of the mouth, after he had heard us speak of the external incisions, and felt us mark imaginary ones with the finger.

He was placed under milk-punch, beef-tea, chloride of iron, and quinine; anodynes at night. Permanganate of potash, gr. ij to f℥viij water, was used as a mouth-wash.

At first I had no other idea than performing the regular operation

of excision of the jaw by an external and very extensive dissection; the celebrated operation of Dr. J. R. Wood, of New York, in 1856, and other operations for this disease, by external incision, being my guide. The patient's own request to operate from within, led me to think why this disease should be treated differently from ordinary necrosis, and whether cutting down directly on the part, and moving the dead bone piecemeal or altogether, would not be better than to submit the patient, in his weakened condition, to hemorrhage, to wounds of nerves, and, above all, to the disturbance and probable destruction of the very parts that would be or were engaged in restoration.

On Saturday, January 28, 1865, I operated. Dr. Garretson, who had seen the case, and took great interest in it, kindly lent me a cheek-holder which is used by dentists. By this the necessity for the fingers of an assistant being in the mouth is done away with, and thus much room is gained.

The patient was thoroughly etherized. The teeth that were in the way were extracted. By means of the cheek-holder, held by an assistant, the mouth was widely opened, and with a stout scalpel I made an incision directly along the top margin of the gum, from the root of the coronoid process to the symphysis; the soft parts, including the periosteum, were easily separated from the horizontal ramus, and the jaw was divided at the symphysis with a pair of strong cutting pliers. A blunt-edged cranial elevator was now used, and inserted behind the angle of the jaw. By careful and patient working, I found I could separate the attachments of the pterygoid muscles and the internal ligaments; and I also broke and detached the coronoid process, leaving but small and crumbling portions of it attached to the temporal muscle. I then inserted the elevator behind and above the angle, and tilted the condyle forward. The ascending ramus was now grasped with a pair of strong bone-forceps from the angle to the neck, and by means of twisting movements the rest of the attachments gave way, and the *whole* of the right lateral half of the bone, with the exception of a small portion of the crumbling coronoid, was removed.

The left half now claimed attention. About an inch and a half of this beyond the symphysis seemed to be diseased. The periosteum was readily recognized on this portion. The tongue was secured by passing a double ligature through its body, and by means of a loop it was held by an assistant. This proved to be a wise precaution, for although it is considered unnecessary by some authorities, we found that in this case, as soon as the genio-hyoid muscles were divided, all control of the tongue was lost, and it would certainly have fallen back on the glottis, had it not been for the loop. In Dr. Wood's case the patient swallowed her tongue, and was very near being suffocated. This precaution, it appears to me, is much more necessary when anæsthetics are used; for after the patient has his senses, and his head moderately elevated, there seems to be no danger from the

slippery organ. This was proved in our case; for when the loop was removed on the day after the operation, the patient had a moderate degree of control of, and no tendency to swallow the member.

To return, the tongue muscles having been divided, and the gum and periosteum separated as far back as to what appeared to be a healthy portion, a chain saw was inserted, and the piece was readily cut out on a line corresponding with the anterior border of the first molar tooth. The hemorrhage was slight; but a few ounces of blood were lost, and no vessels required ligature. The time required was about three-quarters of an hour, much of which was employed in keeping the patient thoroughly under the ether, as the sponge had to be reapplied several times, the seat of the operation precluding its continuous use.

Feb. 1. The case is progressing very favourably, and the patient says he is decidedly more comfortable than before the operation. A lotion of muriate of ammonia and laudanum was applied to the swollen parts externally; the permanganate of potash is being injected daily, and often as a mouth-wash; the puriform discharge now is very slight. The patient swallows punch, beef-soup, arrowroot, and soft egg without difficulty. He sleeps much better than before the operation. As before stated, the loop was taken from the tongue on the day after the jaw was removed. To-day I found the patient up and walking to the bath-room for water. He was quite strong, and was able to converse with a considerable degree of facility. He has no doubt of a rapid recovery; but, from the history of other cases, I should not be surprised if the remaining portion of bone on the left side would become involved in the disease, and require removal.

Courtney gave me some interesting facts in answer to questions to-day. He says that his room is separated from the others; that he was exposed to the fumes of phosphorus arising from the paste, which is spread on a warm metal plate; that he was occupied but about half the day, at intervals, and spent the rest of it in fresh air; that the only mistake he made was in returning to his occupation immediately after the tooth was extracted. He is acquainted with the amorphous or allotropic phosphorus, and confirms the statement that it does not produce disease when used in match-making; but it does not make as salable an article as common phosphorus, on account of requiring a special arrangement to ignite it.

He was very particular not to let me into the secrets of the trade, and would not acquaint me with the composition or proportions of the materials used. He said there was one thing he wished me to know, and that was, that no man in the trade that wore a full beard and moustache was ever known to have the disease. He himself is naturally deficient in these useful appendages to a match-maker.

I asked him about children. He says they are employed in various departments, from five years old and upwards, but the disease does not attack them while undergoing second dentition. In confirmation of this

statement, I notice all the cases I can find recorded by Dr. Wood and others range from sixteen years old and upwards.

I have nothing new to offer in regard to the pathology of this curious disease. It is very remarkable that a certain form of a substance that enters so largely into the composition of bone should be so destructive of it, while other forms, chemically the same, should be harmless.

Dr. R. E. Rogers kindly examined some of the new deposit, and found it to be "simply bony matter, being chiefly phosphate of lime and animal tissue."

Dr. Edw. Rhoads and myself examined the old bone and new deposit microscopically. That the latter is a modification of bone-substance is plainly to be seen.

I would particularly call attention to the mode of operation in this case. I know there are cases of disease of the jaw that may require very extensive external dissections, but it is questionable whether necrosis should be treated by that means. Would it not be better to take the dead bone away in pieces, if it were found impracticable to gain such a fortunate result as in my case?

There is very little allusion to this mode of operating by surgical writers, and any tyro led by the authorities would, I am confident, prepare himself to perform the operation *secundem artem* by external incision. This certainly would have been my case, had not the patient himself asked me to operate "inwardly," and thus caused me to take the subject into consideration.

March 1. The patient has made very rapid progress towards recovery, and has not had a single drawback. The remark that Dr. Wood makes in the report of his case may be repeated here, that "the benefit which this patient derived from surgical interference was never surpassed in my experience." From being one of the most disgusting of objects both to himself and to others, he is now quite presentable. There is no unpleasant odour about him. The sinuses have healed. The end of bone on the left side is covered with healthy granulations. The articulation is good, very much better than before the operation. The patient can eat bread with soup, and has no difficulty as to diet; in fact, there is no one circumstance, either as to general health or as to local improvement, in which he is not the gainer. This remark may be qualified as to one point, and that is, that there is loss of sensation on the front of the chin and lower lip, from a quarter to half an inch on each side of the mesial line. The parts supplied by the anterior mental nerves may be readily traced by marking out the line of sensation. The patient says that he is improving in this respect, so that there is reason to believe that other branches of the fifth pair may take the place of those destroyed.

The benefit of the mode of operating has become particularly manifest. The line of new deposit being totally undisturbed, is getting firmer every

day, and by its connection with the piece of the left jaw, has retained that in position, so that, should it not become necrosed, it will be very useful. The wisdom tooth of this piece is not yet cut, and as all the teeth of the upper jaw are good, the patient looks forward to enjoying a moderate degree of masticating power.

ART. X.—*Exsection of Right Clavicle.* By I. R. TRYON, M. D., Ass. Surg. U. S. N. (Communicated by W. Whelan, M. D., Chief Bureau Med. and Surg. U. S. Navy.)

PETER PITTS (mulatto), landsman, æt. 19, native Conn., from U. S. S. Hartford, admitted with gunshot injury received in action at Mobile Bay, Aug. 5, 1864. Patient supposed to have been wounded by a fragment of shell, which entered midway between articulations of the clavicle of right side, splintered the bone to both sternal and acromial extremities, fractured the first two ribs near sterno-costal articulation, passed through apex of right lung, and made its exit through scapula just beneath the spine of that bone.

Wound of entrance oval, edges jagged and inverted, with fractured extremities of clavicle pressing downwards and inwards upon the bloodvessels and nerves in that region.

Wound of exit nearly circular, edges lacerated and everted, with spiculæ of bone from clavicle and scapula protruding.

Six hours after the injury patient (being quieted from time to time by the inhalation of chloroform) was brought under the attention of the surgeons of the Hartford.

After careful examination, finding no portion of the clavicle could be preserved, Dr. James C. Palmer, Surgeon of the Fleet, removed the entire bone. During the dissection the attachments of the sterno-cleido-mastoid and trapezius to the clavicle were removed; the external jugular was the only vessel tied. The edges of the wound were brought carefully together by the interrupted suture, and water dressings applied; the spiculæ of bone removed from wound of exit, and dressed in the same manner.

Patient bore transportation exceedingly well, and on the afternoon of August 6, when admitted into the Naval Hospital at Pensacola, symptoms were quite favourable.

8th. Many additional pieces of bone were removed from wound of exit, and sutures taken from incision made by the operation. On account of the severe injury to the lung, pneumonia soon supervened, and very little hope of recovery was entertained by reason of the severity of the attack.

However, on the 19th, patient was fully convalescent from the pneumo-